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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/552,767

10/12/2005

Jeroen Anton John Leijten

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04/17/2008

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EXAMINER

HUISMAN, DAVID J

ART UNIT

PAPER NUMBER

2183

MAIL DATE

DELIVERY MODE

04/17/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/552,767	LEIJTEN, JEROEN ANTON JOHN	
	<b>Examiner</b>	<b>Art Unit</b>	
	DAVID J. HUISMAN	2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 11 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-3 and 5-13 have been examined.

#### ***Papers Submitted***

2. It is hereby acknowledged that the following papers have been received and placed of record in the file: Power of Attorney as received on 10/27/2007, and Amendment as received on 2/11/2008.

#### ***Claim Objections***

3. Claims 1 and 8 are objected to because of the following informalities: It is asked that applicant remove the dashes prior to the first four limitations of claims 1 and 8. The examiner deems them to be unnecessary and, in addition, conflicting with strikes used to denote deletion in amended claims. Appropriate correction is required.
4. Claims 12 and 13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Specifically, claim 8 is a method claim and a method cannot be further limited by defining structure, as is done in claims 12 and 13. A method can only be limited by adding or narrowing steps. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 8-13 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Regarding claim 8, the limitation "the execution unit" is recited in line 13. There is insufficient antecedent basis for this limitation in the claim.

8. Claims 9-13 are rejected under 35 U.S.C. 112, 2<sup>nd</sup> paragraph, for being indefinite, because they are dependent, either directly or indirectly, on an indefinite claim.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-3, 5-6, and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp et al., U.S. Patent No. 5,748,936 (herein referred to as Karp), in view of Kogge, "The Microprogramming of Pipelined Processors," 1981 (herein referred to as Kogge).

11. Referring to claim 1, Karp has taught a processor arranged for execution of a program, the processor comprising:

- a) a plurality of execution units. See Fig.2, components 30.

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b) a register file accessible by the execution units. See Fig.2, components 32, and column 5, lines 7-8. Note that one register file may exist, or multiple register files may exist, where in the case of multiple register files, each would be a sub-file making up an overall register file.

c) a communication network for coupling the execution units and the register file. See Fig.2.

Clearly, execution units must be coupled to the register file(s).

d) a controller arranged for controlling the processor based on control information derived from the program, characterized in that at least a first execution unit and a second execution unit, of the plurality of execution units within the processor, are arranged to produce a second identifier on validity of an output result for corresponding output ports of the first and second execution units, the processor being arranged to dynamically control writing of result data corresponding to an operation into the register file, based at least on the second identifier. See Fig.5 and column 10, lines 1-60. Note that result writing is based on predicate, poison bit, and exception information. At least one of these items qualifies as the second identifier.

e) Karp has taught a data-stationary processor but has not taught a time-stationary processor, as known in the art. However, Kogge has taught the concepts of both data-stationary and time-stationary control. More importantly, Kogge has taught that a pipeline can support both types of controls. See the 1<sup>st</sup> full paragraph on page 65. The implementation of time-stationary control requires the hardware of Fig.2(a) and the implementation of data-stationary control requires the hardware of Fig.2(b). Hence, it can be seen that implementing time-stationary control requires fewer buffers (less hardware) than its counterpart. Consequently, it would have been obvious to one of ordinary skill in the art to modify Karp to include time-stationary control as opposed to data-stationary control. One would be motivated to make such a combination to reduce

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hardware cost, and further, the producing an identifier on validity of a result would still apply because time-stationary processors are able to support conditional branches. See page 67, column 2, and page 68. The validity identifier in Karp is produced in response to branch instructions when speculative execution begins.

12. Referring to claim 2, Karp in view of Kogge has taught the processor according to claim 1, characterized in that the control information further comprises a first identifier on the validity of the operation, and wherein the processor is arranged to dynamically control writing of result data corresponding to the operation into the register file, based on the first identifier and the second identifier. See Fig.5 and column 10, lines 1-21. Note that the first identifier may be interpreted as the predicate information. Essentially, at any point before results are to be written, if it is determined that a predicate is false and that an instruction should not modify the state of the system, result data is not written to the register file. If the predicate is true, then result data could be written to the register file if other factors are satisfied. The other factors include the poison bit value and whether an exception was generated. Either one of these qualify as the second identifier. For instance, see Fig.5, step 212, and column 10, lines 58-60. Note that the second identifier (an exception identifier) identifies whether an exception has occurred for a given instruction, i.e., whether that instruction has erred in some manner. If an exception occurs, then results are not written. Results are written if an exception does not occur.

13. Referring to claim 3, Karp in view of Kogge has taught the processor according to claim 2, characterized in that the first identifier is delayed according to the pipeline of the corresponding execution unit arranged for executing the operation. See column 10, lines 16-21.

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14. Referring to claim 5, Karp in view of Kogge has taught the processor according to claim 3, characterized in that the processor is further arranged to dynamically control writing of result data corresponding to the operation into the register file, based on the first identifier, the second identifier and an input datum. See Fig.5, and note that each of the first identifier (predicate), the second identifier (exception), and an input datum (either poison bit shown in Fig.5, step 208, or the result itself, which is an input to the register file) plays a role in controlling writing to the register file.

15. Referring to claim 6, Karp in view of Kogge has taught the processor according to claim 1, characterized in that the register file is a distributed register file. See Fig.2 and note that a register file is divided into multiple sub-register files 32) which are distributed throughout the system for use by the execution units.

16. Referring to claims 8-12, claims 8-12 are rejected for the same reasons set forth in the rejections of claims 1-3 and 5-6 above, respectively.

### ***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Karp in view of Kogge and further in view of the examiner's taking of Official Notice.

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19. Referring to claim 7, Karp in view of Kogge has taught the processor according to claim 1. Karp has not explicitly taught that the communication network is a partially connected communication network. However, Official Notice is taken that partially connected communication networks, and their advantages, are well known and accepted in the art. A partial network is where at least one execution unit is coupled to less than N register files. One example would be where integer circuitry is couple to an integer register file and floating-point circuitry is connected to a floating-point register file. Since, integer circuitry does not operate of floating-point numbers or write floating-point numbers, then the integer unit does not have to be coupled to the floating-point register file. Clearly, by requiring less wiring than a fully connected network, the partial network is less expensive in terms of silicon. As a result, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Karp such that the communication network is a partially connected communication network.
20. Referring to claim 13, claim 13 is rejected for the same reasons set forth in the rejection of claim 7 above.

### ***Conclusion***

21. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after



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the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID J. HUISMAN whose telephone number is (571)272-4168. The examiner can normally be reached on Monday-Friday (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4162. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David J. Huisman/  
Primary Examiner, Art Unit 2183  
March 26, 2008